

## **Idaho's Statewide Monitoring Guidelines for *Ceutorhynchus litura* and Canada Thistle:**



### **Overview:**

A critical part of successful weed biological control programs is a monitoring process to measure populations of the biological control agents and the impact that they are having on the target weed. Monitoring should be conducted on an annual basis for a number of years. The Idaho State Department of Agriculture, in conjunction with the University of Idaho, Nez Perce Biocontrol Center, and federal land management agencies has developed the monitoring protocol below which enables land managers to take a more active role in monitoring populations and the weed control ability of the Canada thistle stem mining weevil,

*Ceutorhynchus litura* (CELI) in efforts to control Canada thistle, *Cirsium arvense*. This monitoring protocol was designed to be implemented by land managers in a timely manner while providing data which will enable researchers to better quantify the impact of CELI on Canada thistle throughout the state .

### **Canada thistle:**

Canada thistle is an aggressive, colony-forming perennial weed that reproduces by seed and deep, extensive horizontal roots. Flowering occurs from June through August. The flowers are urn-shaped, purple (sometimes white), and male and female flowers occur on separate plants with heads ranging from ½ to ¾ inch in diameter. Fruits are about 1/8 inch long and brownish with a tuft of hairs at the top. Stems are typically 1 to 4 feet tall with alternate, oblong or lance-shaped leaves divided into spiny-tipped irregular lobes. Canada thistle is a native of southeastern Eurasia and was introduced to Canada as a contaminant of crop seed in the 18<sup>th</sup> century. It can commonly be found in gardens, flower beds, pastures, cultivated fields, rangelands, forests, and along river banks, ditches and roadsides. Canada thistle can tolerate a wide range of environmental conditions, but requires good light intensity for optimal growth. It is highly competitive with crops and, in heavy concentrations, effectively prevents grazing. A number of accidentally introduced insects attack Canada thistle. However, only two insects are approved for release; *Urophora cardui*, and *Ceutorhynchus litura*.



### **Canada thistle stem mining weevil (CELI):**

CELI is a biological control agent that attacks Canada thistle stems and rosettes. Adults feed on rosette leaf foliage in spring, and larvae consume tissues while mining within the shoots. At low densities, larval and adult feeding does not significantly impact populations of Canada thistle directly. Feeding does cause secondary damage, however, as pathogens and other organisms enter the stems of Canada thistle via holes made by exiting larvae. At high densities, feeding by CELI will reduce the vigor of both rosettes and flowering stems to the point of deterioration. Overwintering weevils emerge from soil litter and feed on leaf and stem

tissue in early spring. Eggs are laid in spring within Canada thistle's bolting shoots, with hatching larvae mining in the stems and root crowns of Canada thistle throughout spring and summer. Multiple larvae (up to 20) can be found in individual stems. Mature larvae tunnel out of the stems, drop to the soil surface, and pupate in the soil. Adults of the new generation emerge in August and overwinter in soil litter. There is one generation per year. The weevil does best in open but moist areas with scattered Canada thistle plants.

### Monitoring:

The Statewide Biological Control monitoring protocol is based upon a permanent 20 meter vegetation sampling transect randomly placed in a suitable (at least 1 acre) infestation of Canada Thistle and timed counts of CELI adults. Annual vegetation sampling will allow researchers to characterize the plant community and the abundance and vigor of Canada thistle. Visual counts of CELI adults will provide researchers with an estimate of CELI population levels.

### Permanent Site Set-up:

To set up the vegetation monitoring transect, you will need: 1) a 25 x 50 cm Daubenmire frame made from PVC (preferred) or rebar, 2) a 20 m tape measure for the transect and plant height, 3) 10 permanent markers (road whiskers and 16 penny nails – see picture below), 4) a post (stake or piece of rebar) to monument the site (see pictures for examples of field equipment), and 5) 30-45 minutes at the site during the **first week of May**. To set up the transect, place the 20 m tape randomly within the infestation. Mark the beginning of the transect with a post. Place permanent markers every 2 m (for a total of 10 markers) beginning at the 2 m mark and ending with the 20 meter mark on the tape measure. Place the Daubenmire frame parallel to the tape on the 50 cm side with the permanent marker in the upper left corner starting at 2m (see pictures). **Refer to the “timed” data sheet for how to conduct monitoring.** Repeat the frame placement at 2m intervals for a total of 10 measurements (one at each permanent marker).

